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DATA FOR EFFICIENCY: A TOOL FOR ASSESSING HEALTH SYSTEMS' RESOURCE USE EFFICIENCY

A TOOLKIT FOR HEALTH SECTOR MANAGERS

December 2013

This publication was produced for review by the United States Agency for International Development. It was prepared by Eunice Heredia-Ortiz for the Health Finance and Governance Project

The Health Finance and Governance Project

USAID's Health Finance and Governance (HFG) project will help to improve health in developing countries by expanding people's access to health care. Led by Abt Associates, the project team will work with partner countries to increase their domestic resources for health, manage those precious resources more effectively, and make wise purchasing decisions. As a result, this five-year, \$209 million global project will increase the use of both primary and priority health services, including HIV/AIDS, tuberculosis, malaria, and reproductive health services. Designed to fundamentally strengthen health systems, HFG will support countries as they navigate the economic transitions needed to achieve universal health care.

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DISCLAIMER

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» ABSTRACT

The health sector accounts for a sizeable proportion of national expenditures in most countries. The pursuit of efficiency in health systems should, therefore, be a central objective of decision makers and health managers. Often, Ministries of Health do not have access to the data to properly assess internal efficiency across their operations—including physician utilization, deployment of health technologies and pharmaceuticals, and use of health facilities and hospital care. Measuring efficiency across institutions and across time is a critical element for improving the performance of health systems. The data for efficiency tool outlines key data categories and indicators necessary for assessing efficiency in the use of resource inputs, provides guidance on sources for these data, and calculation of indicators. Applying this tool, managers within Ministries of Health will be better prepared to defend their budget requests—providing evidence of internal efficiency—while ensuring effective and efficient spending of monies that are allocated.



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» ACRONYMS

ALOS	Average Length of Stay
ART	Antiretroviral therapy
ARV	Antiretroviral
BOR	Bed Occupancy Rate
ER	Emergency Room
FTE	Full Time Equivalent
GFMS	Government (integrated) financial management information systems
HFG	Health Finance and Governance Program (USAID)
HIS	Health Information System
HMIS	Health Management Information System
ICT	Information and communications technology
IV	Intravenous
KPI	Key Performance Indicator
MDS	Minimum data set
MOF	Ministry of Finance
MOH	Ministry of Health
M&E	Monitoring and evaluation
PEFA	Public Expenditure and Financial Accountability
PFM	Public Financial Management
PFMRAF	Public Financial Management Risk Assessment Framework
PI	Performance Indicator
SMART	Smart, Measurable, Achievable, Relevant, Time-bound
TB	Tuberculosis
USAID	United States Agency for International Development
WHO	World Health Organization

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» INTRODUCTION

Why is this Tool Necessary?

Finding adequate resources to finance health systems has become a real challenge for countries around the world. This challenge is exacerbated in vulnerable developing countries that lack sufficient funds to meet their populations' basic health needs and demands. Increased pressures on health care resources have led policymakers, administrators and clinicians to search for more efficient ways to deliver health services.

Increasing public resources for health—or more precisely, expanding “fiscal space” for health—does not necessarily need to come from greater tax revenue or larger budgets. Oftentimes, it is not the amount of health spending, but the efficiency with which those funds are used, that matters most. Efficiency improvements in the health sector, even in small amounts, can yield considerable cost savings and even facilitate the expansion of services for the community. Minimizing waste, corruption and other forms of inefficiency—estimated between 20-40 percent of total health spending by the *World Health Report 2010*—means that countries' health systems can achieve more with the available resources.

Why do some countries obtain relatively higher levels of service coverage and health outcomes than do others for the resources they invest? The answer lies in variation in efficiency. Inefficiencies exist everywhere in health systems with different degrees varying by country and setting. The most common sources of inefficiency include: inappropriate use of medicines; poorly executed procurement, including paying too much for medicines or technologies; misallocation and mismanagement of human and technical resources; under-use of capital equipment, particularly hospitals; excessive length of inpatient stays, or higher-than-needed admission rates; leakages, waste and corruption; medical errors; and an inappropriate mix of interventions (WHO, 2010).

A major weakness of Ministries of Health (MOH) management information systems is the lack of data useful for measuring and assessing management accountability, effectiveness, and efficiency of health services. Ministries of health often do not have access to the data required to assess efficiency across their operations, and even when those data are available, Ministry personnel are not prepared to assess and/or demonstrate operational efficiency and effectiveness.

Moreover, the absence or paucity of such data makes it difficult to assess performance and manage operations at the facility level, where the relative costs and productivity can vary widely from one facility to another, and can change from one year to the next. Having an analytic framework that enables Ministries of Health to measure and compare performance—across facilities, across regions, and over time—is, therefore, not only a critical tool for sector-level monitoring and evaluation, but also for informing management reviews, decision making and action plans, from the policy level all the way down to front-line service delivery units.



At the same time, Ministries of Health that are armed with evidence of performance efficiency are better prepared to defend their annual budget requests and, in turn, advocate for greater resources for health. A Vice-minister of Finance recently expressed his frustration with the Ministry of Health's frequent requests for augmentation to the sector's budget appropriation without well-justified requests. Given that the health sector has to compete for funds with other sectors, complementing such requests with information derived from this health sector assessment can provide better informed budget requests and budget change proposals, very promising for improving fiscal space for health.

What this Tool is.

This tool is intended to help health program managers and administrators to better understand and assess efficiency in the delivery of health care services. In response to the complex task of measuring and assessing efficiency, this tool outlines key efficiency indicators in the use of resource inputs in the following areas:

- ▶ deployment of health personnel;
- ▶ utilization of medical products, vaccines and technologies; and
- ▶ use of health facilities and hospital care.

Such integrated data should be used by MOHs' upper management to:

- a. assess management performance;
- b. strengthen budget preparation and justification in the annual budget preparation process;
- c. assist in health planning and policy evaluation—measuring efficiency while identifying inefficiencies and understanding where to begin focusing efforts to improve health services.

The indicators proposed here are generic enough to be adapted to different settings and can serve as the basis for cross-country and within country comparisons over time. Some require information that can be relatively easily and frequently collected, while others demand more rigorous data collection and analysis.¹

¹ While public and private health systems might face different incentives in delivering health services, performance measurement and operational efficiency principles apply to both public and private providers.



What this Tool is not.

This tool is not intended to provide a diagnosis. Nor will it solve systemic problems that exist within a specific health sector organization or program. However, it can provide signposts that illuminate the “pain points” or sources of inefficiency in health service delivery, and flag issues that may call for more advanced measurement techniques.² In turn, it can also inform the menu of options that health sector decision makers have to improve the management of health resources.

This tool does not set specific benchmarks, not least because performance standards can and will vary widely depending on a variety of factors, including civil service rules, budget constraints, and human and institutional capacity, among others. However, in using the tool to establish baselines, it can provide program managers with a basis for determining appropriate efficiency levels and standardizing them within their own health system.

Additionally, this tool focuses strictly on measuring efficiency in the use of resource inputs and, thus, excludes other important dimensions, such as efficiency in the transfer and flow of funds in government—the operational efficiency of the government’s public financial management (PFM) functions. These dimensions are no less important, but are treated separately from this tool for the sake of focus and manageability.

² More advanced economic evaluation techniques include: cost minimization analysis, cost-effectiveness analysis, cost-utility analysis, cost benefit analysis, and stochastic frontier production models. For more on these and other methodologies for measuring efficiency of health services, see Oxley and MacFarlan (1995) and Peacock et al (2001).

» IMPLEMENTING THE TOOL STEP-BY-STEP

Phase I: Before Starting.

Before Making Use of the Tool

Hold a high-level discussion—or steering committee—to define the strategic objectives for performing such an efficiency assessment, including a discussion on how the information will be used internally (within the MOH) and externally—with other government entities, such as the MOF, or the general public.

Official approvals might be required to allow the assessment team to collect information, particularly at the facility level, or to conduct client surveys. Responsibility for undertaking this task might be housed within the planning department or monitoring and evaluation unit within the Ministry of Health.

Assign a working group which will operationalize the tasks, or contract out the task. This group is responsible for understanding the concepts and for gathering and analyzing the data required to develop the indicators provided in this tool. The size and composition of such a working group should be tailored to the specific environment. It is recommended that at a minimum, the group include a three-person core team; two senior experts, and one junior expert/research assistant. The team should be composed of experts in the health field and Economics or a related field. The total level of effort is estimated at 3 weeks.

Garner strong collaboration across various actors within the health sector, within the ministry, health facilities and managers, at different levels of government. This is possible through strategic communication of the goals and parameters of the efficiency review, creating transparent mechanisms for seeking input and feedback from officials at different levels within the health sector, and being transparent about how the findings will be used.

Build commitment for performing the assessment on an annual basis in order to compare performance across time, across regions and across facilities. The demonstration of how the study has been or will be used to realize efficiencies and allocation of savings into achieving priorities of the health ministry, or to leverage additional funding from the Ministry of Finance, will be critical to building this commitment. The first time the assessment is performed will serve as a baseline study. Subsequent assessments should be compared to the baseline study and should include—as part of the new assessment—a post-assessment analysis of options, recommendations, and action taken for improving efficiency.

Phase II: Learning Key Definitions and Terminology.

Measuring and improving efficiency in healthcare requires common understanding of key definitions and agreement on what constitutes an efficient (and therefore inefficient) health care system. Efficiency is usually defined differently by purchasers, payers, consumers and providers, all of whom can have a different perspective on what constitutes quality care at the appropriate cost.

- ▶ Before efficiency can be appropriately defined, it is important that all those involved in the use of this tool—particularly the working team undertaking the assessment—understand that the delivery of healthcare services involves a production process with different components.
- ▶ Improve understanding of the health services production process, its variables, its determinants. Define the different types of efficiency—productive, technical and allocative—whose objective is to reduce waste, save money, and maximize social value, respectively.

We now turn to defining the health production process and the measurement of efficiency in healthcare. In general, measuring efficiency involves three tasks (Peacock et al, 2001):

- ▶ *Identifying relevant model variables:* measuring efficiency requires a conceptual framework that specifies the production process, identifies the determinants of performance, and derives efficiency measures in terms of well-defined variables (See Figure 1).
- ▶ *Formulating efficiency measures incorporating these variables:* involves the selection of an appropriate evaluation technique based on its capability to generate robust and informative efficiency estimates, and to adapt to features of the production process being analyzed.
- ▶ *Obtaining data to represent these variables and calculate the efficiency measure:* requires collecting data that are well defined, accurate, and consistent with the conceptual framework underlying the efficiency measure.



Understanding the Health Service Delivery “Production Process.”

The Health Production Model presented here provides a basic, useful conceptual framework for understanding the drivers of efficiency in health service delivery. As Figure 1 illustrates, health outcomes in a population are the result of a “production process.”

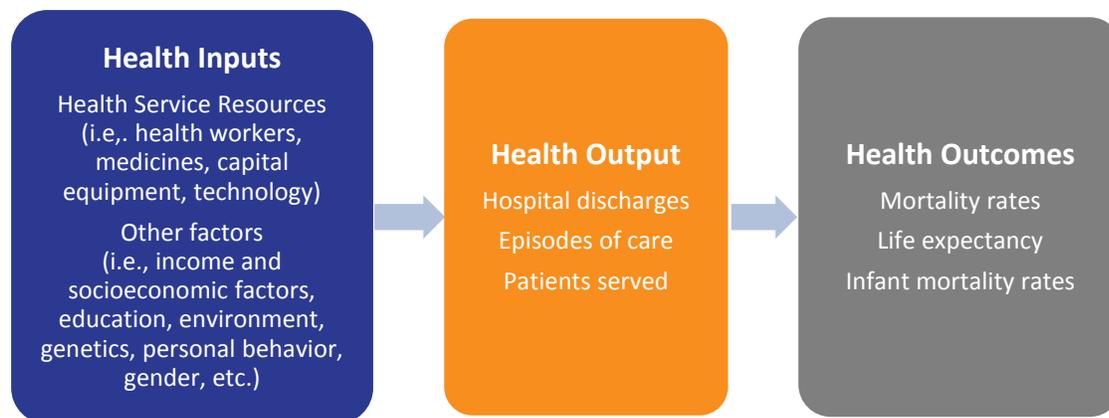
Health inputs, such as human resources, equipment, and medicines, deployed in an environment of exogenous factors affect health outcomes such as the populations’ genetics, environment, education, income and behavior (physical exercise, alcohol use, smoking incidence, bednet use, hygiene, etc.).

All input factors influence the provision of health services, which, in turn, brings about a level of health outputs, such as patients served, beds filled, or children vaccinated. These outputs, in turn, affect the levels of health outcomes in the population, including birth rates, disease incidence, and life expectancy, to name just a few.

When health inputs are optimized, the desired health outputs (and ultimately, health outcomes) should be produced at the lowest possible cost, both in terms of public resources, and in terms of private (out-of-pocket) spending.

It is through the lens of this conceptual framework that this tool was designed: namely, viewing the efficiency of health service delivery as directly related to resource inputs and the outputs they produce.

Figure 1. A Health Production Model



Understanding Efficiency in Healthcare

- ▶ Efficiency in the use of healthcare resources is not only about using the technologies and techniques of production that ensure the highest possible output for the available inputs, known as *productive efficiency*.
- ▶ *Technical efficiency* is very closely related, ensuring that desired output is produced with the least cost combination of inputs (i.e. keeping hospital length of stay down to a level that still ensures safe and appropriate discharge). Technical and productive efficiency together ensure that the available resources produce the greatest possible output or combination of outputs, and, at the same time, that those outputs are produced at the least possible cost.
- ▶ *Allocative efficiency* is concerned with whether the mix of goods and services produced (given technical and productive efficiency) is the mix that is of most value to society. Table 1 summarizes these definitions.

In the health sector, technical and productive efficiency are often considered together: would it be possible to reduce the costs of running a 50-bed hospital; or would it be possible to get more than 3,000 inpatient visits and 1,000 inpatient bed-days from the resources invested in a health care facility? Allocative efficiency is interpreted in terms of the mix of interventions produced at the right time in the right place that would maximize population health – usually measured in terms of years of life saved, healthy years of life saved, or disability-adjusted life years gained – for the available resources (Chisholm and Evans 2010).

Table 1. Defining Efficiency in Health Care

	Productive Efficiency	Technical Efficiency	Allocative Efficiency
Definition	Outputs cannot be produced with less of some input	Outputs cannot be produced at lower cost	No person can be made better off without making someone else worse off
Opportunity	Reduce Waste	Save Money	Maximize social value
Sample Inefficiencies	1) Excessive low bed occupancy rate 2) Expired drugs and IV fluids	1) Unnecessary use of antibiotics 2) Inadequate lengths of stay	1) Bednets versus polio vaccines 2) Wrong scale and scope in hospitals



Phase III: Identifying Key Indicators for Measuring Efficiency in Healthcare.

Increased pressures on health care resources have led policy makers, administrators, and clinicians to search for more efficient ways to deliver health services, and the indicators set forth below can facilitate a high-level assessment across dimensions of importance to all of these stakeholders. Efficiency improvements in the health sector, even in small amounts, can yield considerable savings of resources or expansion of services for the community.

This tool provides a list of indicators that help measure efficiency in the management of healthcare resource inputs in the following three categories:

- ▶ health personnel utilization (e.g., physicians, nurses, technicians and other medical staff)
- ▶ health equipment and pharmaceuticals (such as medications, medical equipment)
- ▶ capital (health facilities and care)³

While this section provides the full myriad of efficiency indicators for each of the three health resource categories, Table 2 provides selected, key efficiency indicators in resource input use. This table then becomes a guide for measuring key efficiency indicators. The working group undertaking the assessment may discuss and select the efficiency indicators that are appropriate for the country's health system under assessment. Once indicators are selected, the working group shall design a strategy for data collection. Some data may already be available at the MOH, while other data, particularly data at the health facility level might need gathering via surveys. (See the next section for guidance on data collection and data reporting and use).

³ Administrative inputs are omitted for the purpose of this tool. Additionally, this tool excludes measuring the efficiency in the flow of funds in government—the operational efficiency of the government's public financial management (PFM) functions. See HFG's tool on PFM indicators for the health sector, such as PEFA indicators, USAID's stage 2 PFMRAF, and other PFM indicators.

Table 2. Key Efficiency Indicators Related to Health Systems' Resource Use

	Indicator	Benefit	Calculation	Example
Current Staff Utilization				
Understanding the current mix of staff is critical to understanding if more could be achieved with the same resources over time.				
1	Ratio of health personnel to administrative personnel	Assess the proportion of health staff to administrative staff in a facility	Total number of health staff in each facility in FTE (full time equivalent), that is physicians, nurses, mid-wives, dentists, pharmacists, other, relative to non-health staff or administrative personnel.	One out of two staff members is a health professional.
2	Ratio of doctors to total health personnel	Assess the composition of health personnel as well as the availability of doctors among health personnel	Total number of FTE doctors divided by the total number of FTE health personnel	One out of four health professionals is a doctor
3	Ratio of generalist physicians to specialist physicians	Assess the availability of specialists versus generalist physicians in a facility	Total number of FTE generalists divided by the total number of FTE specialists	X FTE generalist doctors for every specialist physician
4	Ratio of wages outlays to goods and services spending	Assess the proportion of spending allocated to paying staff's wages	Wage outlays divided by goods and services spending (such as hospitals, physicians, and retail prescription drugs)	X percent of goods and services spending pays for wages
5	Health Workers Attendance Rate	Measures time available to provide services and helps identify the "lost time rate"	Proportion of health care providers who are at their work site, or who have approval for absenteeism during the period of observation.	X% attendance rate (that is (1-X) % rate of absenteeism)
6	Patient loads and time spent with patients	Measure the overall patient loads in a facility	Total number of doctor and patient visits in one month / number of FTE doctors (and dentists). Calculate these by number of visits in one day and in one hour. Average time spent with each patient per visit	X number of patients per provider X number of patients per day and per hour X number of minutes spent per patient
7	Density of physician/nurses (per 1,000 population)	Assess the availability of FTE physicians and nurses for every 1,000 citizens	Measure the number of FTE physicians and nurses in a geographic region and divide by the population of the region in a scale of 1,000 people.	X number of physicians/nurses for every 1,000 people in X region

	Indicator	Benefit	Calculation	Example
Health Technologies and Pharmaceuticals				
Medicines, diagnostic tests, and lab tests represent core elements of health care provision, and are important to assure the timely availability, maintenance, stocks, storage, and distribution of medicines, medical consumables, and vaccines for medical facilities.				
8	Percent use of generic drugs	Measures utilization of lower cost medicines such as generic drugs	Percent of drugs purchased by the Ministry of Health that are generic	X% of total drugs purchased are generic
9	Minimization of waste in medicines	Measures the rational use of medicines while minimizing waste	Percentage of medicines and others destroyed due to expiration, breakage, and/or inappropriate storage conditions	X% of medicines destroyed
10	Lab turnaround time	Know how your lab is performing compared to acceptable norms	Date test submitted - Date test results disclosed to physician (per test type)	Test type 1 = X day turnaround; Test type 2 = Y day turnaround
11	Usage levels of hospital high-value equipment	Know how many shifts (3 in one day) high-value hospital equipment is being used. Too high or too low levels might indicate: lack of trained staff to operate equipment or equipment is non-functional.	Dividing the day in 3 shifts, calculate the number of shifts in a day when the medical equipment is operating. Working group should define parameters for categorizing equipment to be assessed.	A unit of equipment operating 2 shifts in a day, on average, in a week. An x-ray machine operating 1 shift a day, on average, in a week
Health Facilities and Care				
Health facilities care is a critical component of a comprehensive health service, also constituting a major cost category. Hospitals, or health facilities at various levels, bring together numerous resource inputs, including physical capital (buildings), human capital (health and administrative personnel), and supplies (including drugs and equipment).				
12	Bed occupancy rate (BOR)	Know how effective facilities' resources are managed	$(\text{Total beds (x days)} / \text{inpatient days of care (x days)}) * 100 = \text{Rate\%} / \text{x days}$	200 Beds (90days) / 170 inpatient (90days) = 85% / past 90 days
13	Average Length of Stay	Know how long patients stay at your facility and find out why that is.	(Date of admission - Date of discharge)	Length of stay = X days
14	ER Waiting times	Know how long patients are waiting to be admitted in your ER	(Time of check-in - Time of admittance) / x days	90 min wait / past 30 days
15	Average cost per facility inpatient day	Measure the cost factor of an inpatient day, allowing to compare across facilities and across time	Total personnel, capital and food costs (excludes drugs and diagnostics test)	An average bed cost per day of \$X.



Deployment of Health Personnel

Doctors, nurses and other health workers are at the core of a health system, representing a major category of cost and a critical input—where their numbers fall below a certain level, health systems can no longer be expected to operate effectively. An efficient workforce is one where there is effective planning (choosing the right skill mix of workers); personnel has appropriate training; they have adequate supervision and compensation while working; physician productivity and avoidance of excessive migration out of or attrition to the workforce at the exit stage. Selected efficiency indicators for this category include:

- ▶ **Facility staff utilization:** While there's no one staffing formula that fits every facility, there are indicators that help assess and compare staff mix and staffing costs across facilities and across time. Total number of medical staff in the facility in FTE (full time equivalent) including physicians, nurses, mid-wives, dentists, pharmacists, other. The following indicators help assess efficiency in hospital staffing:
 - Ratio of health personnel to administrative personnel: to assess the proportion of health personnel (physicians, nurses, mid-wives, dentists, pharmacists to administrative, non-health personnel).
 - Ratio of doctors to total health personnel: to assess the proportion of total health personnel who are physicians. Some more remote regions in a country might have very low to none physicians available among their health personnel mix.
 - Ratio of specialist physicians to total physicians: Generalist physicians may be ample, but specialist physicians are scarce. Certain medical conditions and surgical procedures require availability of specialist physicians.
 - Ratio of wages to goods and services spending: to assess the proportion of goods and services outlays that is allocated to wages. It also measures spending in this category that is used for purposes other than compensation.
- ▶ **Health workers attendance rates:** Helps to assess productive efficiency by capturing the attendance of providers (i.e. nurses, physicians) at their location of work during contracted hours, while helping reduce waste. This indicator is defined as the proportion of health care providers who are contracted to be at work on site during the period of observation, and who are present. This is also an internal control indicator which has a direct effect on physicians' productivity. In Tanzania, for example, Kurowski et al (2003) estimated that unexplained absences and time spent on breaks, on social contacts and waiting for patients reduced levels of productivity by 26 per cent.
- ▶ **Percent of Ministry of Health hospitals with an assigned emergency medical physician:** This indicator measures the extent to which the essential medical staff has been placed across hospitals. All hospitals should have at least one emergency medical physician. A more precise indicator may be the following:
 - Density of physician/nurses (per 1,000 population): measures the number of physicians/nurses available (in a region) per 1,000 habitants.

- ▶ **Physician Productivity:** This category measures workload rates per physician and helps quantify the amount of output that can be obtained given the current mix of staff. Great differences across hospitals or across providers could indicate sources of inefficiencies. Indicators in this category include:
 - Patient loads (number of doctor (and dentist, if available) visits per FTE provider, per day, per hour); amount of time spent with patient in one visit.

Health Technologies and Pharmaceuticals

Medicines, diagnostic tests, and lab tests represent core elements of health care provision. There are ample opportunities for the over-supply of health technologies and pharmaceuticals. It is also important to assure the timely availability, maintenance, stocks, storage, and distribution of medicines, medical consumables, and vaccines for Ministry hospitals and clinics. Efficiency indicators for this category include:

- ▶ **Percent of drugs purchased by the Ministry of Health that are generic:** the rational and cost-effective use of medicines calls for patients to receive the appropriate medicine for the lowest cost possible. A key form of inefficiency in the use of pharmaceuticals concerns the under-utilization of generic (as opposed to branded) drugs—ensuring that these have equivalent efficacy—which are substantially cheaper to procure. A survey in the United States estimated that \$8.8 billion (11% of drug expenditure) could be saved by substituting generic for brand-name drugs (Haas et al, 2005). This criterion should be carefully analyzed in the context of the country being assessed, since some countries have less flexibility in choosing between branded and generic drugs, the quality in efficacy may widely differ, and/or they must settle for the type of drugs that can be imported.
- ▶ **Percentage of medicines and others destroyed due to expiration, breakage, and/or inappropriate storage conditions:** To assure the timely availability, maintenance, stocks, storage, and distribution of sera, medicines, medical consumables, and vaccines for Ministry hospitals and clinics.
- ▶ **Lab turnaround time:** measures the ability of a lab to process lab results. Create a breakdown for each type of test processed in the lab, since some tests take longer than others to complete. The task is to determine what the acceptable norms are for each type of test, and using that as base comparison for the efficient turnaround metric.
- ▶ **Usage levels of high-value hospital equipment:** Hospital equipment which requires significant investment—such as x-ray machines —also requires to be operated by trained staff. This indicator assesses the under-use of over-use of high value medical equipment. By dividing the day in 3 shifts, the indicator can measure the proportion of time during the day when the medical equipment is operating. For example, an x-ray unit operating all 3 shifts in a day. Low usage of equipment might indicate that the equipment is not functioning or the trained staff is not available to operate the equipment. Further investigation would be required at this point.



Health Facilities and Care

Care at any health facility (primary, secondary, tertiary) is a critical component of a comprehensive health service, also constituting a major cost category, taking up over half or even two-thirds of the total health budget in many countries. Hospitals, or health facilities, bring together various resource inputs, including physical capital (buildings), human capital (health and administrative personnel), and supplies (including drugs and equipment). There are important sources of inefficiency that emerge at the institutional level, a prominent example relates to excessive inpatient admissions and length of stay, and hospitals' scale and scope. Selected efficiency indicators for this category include:

- ▶ **Bed occupancy rate (BOR):** Measures use of facilities over a specified period of time. BOR can fluctuate greatly from one period to the next and from one facility to another. The goal is to set up a value as an acceptable norm to determine why rates are high or low. Too few beds can impact patient satisfaction and outcomes, and too many beds available points to an inefficient use of resources. Internationally, it has been estimated that an empty bed costs two-thirds as much to maintain as an occupied bed, due to fixed maintenance and personnel costs (USAID, 2011).
- ▶ **Average length of stay (ALOS):** measures how long, on average, patients stay in a hospital. This metric can vary widely based on the type of facility (long term care vs. short term) and the type of medical conditions involved. Once data are gathered, investigate why your number is what it is. Is it influenced by hospital acquired infections, or by excellent healthcare service? It is important to give each patient a base-value of 1 to account for all visits, even if they are not overnight. Lack of alternative care arrangements; insufficient incentives to discharge; and limited knowledge of best practice can lead to inappropriate hospital admissions or length of stay.
- ▶ **ER waiting times:** Average amount of time each patient has to wait in the ER before being treated. Important indicator of a facility's performance and patient satisfaction. Wait times are calculated over a specific time period to account for any anomalies in the data. The waiting time is calculated from the time the patient checks-in to the time of admittance to be treated. (Time of check-in - Time of admittance / x days). For example: 90 min wait / past 30 days. This indicator serves as the basis to help the ER deliver better service and, if the data then splits patients into different categories based on severity, this can make assigning the right staff to each patient straightforward. For example: 5 patients waiting (non-severe), 7 patients admitted awaiting attendee (moderate-severity), 2 patients being attended to (severe). This metric is the one that absolutely needs to be calculated in real-time and updated regularly, such as every 15 minutes. Other similar indicators in this category include the waiting times for emergency surgical procedures—which in some countries these may be measured in number of hours or number of days.
- ▶ **Healthcare facility size:** The number of beds in a facility is a critical factor, not just the occupancy rate. While it may make good economic sense to enlarge the size and scope of a facility to make better use of available expertise, infrastructure and equipment, there is a point where a facility departs from its optimal level of efficiency and begins to exhibit diseconomies of scale. Small facilities may also be inefficient because the fixed infrastructural and administrative costs are shared across too small a caseload, thereby pushing up the cost of an average hospital episode (Chisholm and Evans, 2010). While the number of beds in a facility alone



may not reveal a direct efficiency opportunity, if coupled with a measure of the ratio of administrative cost to total cost, may help assess the presence of diseconomies of scale. Uneven historical development of hospitals; inadequate planning, coordination and control can bring about inappropriate facilities size. Analysis of scale efficiency can be useful. For instance, in Zambia such study identified hospitals that could be merged or down-graded (Haas et al, 2005). Research undertaken mainly in the United States and the United Kingdom indicates that diseconomies of scale can be expected to kick in below about 200 beds and above 600 beds (Posnett, 2002).

- ▶ **Assessment of Cost trends:** Cost per hospital/facility bed-day estimates expenses incurred by the hospital/facility to provide a day of inpatient care. These estimates represent only the "hotel" component of facility costs, i.e., excluding the cost of drugs and diagnostic tests but including costs such as personnel, capital and food costs.

Other important cost trends include a measure of capital spending as well as its related maintenance costs—on equipment and infrastructure. Such indicator involves the proportion of capital spending to total spending; and maintenance costs to current spending. In many developing countries, the low capital spending allows for medical equipment to depreciate and deteriorate. Similarly, maintenance of a hospital/facility infrastructure is similarly important, in order to upkeep appropriate health facilities.

Phase IV: Data Collection.

An important consideration for undertaking an assessment of efficiency in the health sector, as presented in this tool, involves the availability of data for certain indicators and the resources that it might take to gather specific data, particularly those related with facility level data. While much of the data might be easily available, others have to be researched from facility surveys and other data sets available through the country's national statistics office.

Once the working group applying this tool selects the indicators to be included in the efficiency assessment, a strategy for gathering data should be developed. The strategy will depend on whether data required for deriving the indicators is readily available or not. While some country's health information systems already contain a repository of information required to derive the efficiency indicators presented in this tool, in some developing countries, data will need gathering. Developing a data collection strategy is particularly important for collecting information at the facility level—required for calculating most key efficiency indicators presented in Table 2.

The following steps should be followed in order to gather data:

- i. Decide if a health facility survey is needed (when data is not available through the country's health information system)
- ii. Plan the survey: Decide the geographic area, sample the health facilities (primary, secondary, tertiary) to survey, and decide the sample size if not all facilities are to be surveyed (see WHO 2003, for step-by-step guidance on health facility surveys).⁴
- iii. Prepare to conduct the survey: prepare survey tables. Annex I contains sample tables that can be used in undertaking the survey. These must be adapted to the country's specific context.
- iv. Entering and analyzing the data: data can be compiled and analyzed in excel spreadsheets. Data needs to be verified whether it is compiled from a health information system or through health facilities surveys. Because calculating indicators only requires basic arithmetic, formulas can be derived in excel to calculate the indicators. Data entry files should be set up in order to consolidate information from facility surveys. Conduct the data entry.
- v. Data analysis and calculations: After data has been entered and verified. Efficiency indicators should be derived for each facility. These may also be grouped by type of facility, region, and aggregated for the entire health system. This exercise will then provide information on efficiency by facility, facility type, by region, and the aggregate.

⁴ May skip this step in countries where data can be compiled from a central health information system.

Phase V: Data Reporting and Use.

The gathering of data and the measuring of specific efficiency indicators for the health sector in a country should result in a report that can be produced on a yearly basis. This report can serve as an internal document for MOH managers to help guide interventions that help mitigate specific issues identified during the process. Additionally, this report can serve as input for budget justifications when submitted to the Ministry of Finance during budget formulation and should be part of ongoing budget reviews (see Box 1 for a sample report outline).

The MOH should prepare the assessment report disclosing the output obtained from the data analysis and efficiency indicators presented in this tool. Main issues in health resource use should be highlighted, and alternatives and recommendations should be presented for tackling such issues. Additionally, it is recommended that data be maintained by the country's information technology directorate, expanding the scope of information to include individual facilities information, including staffing, expenditure data, productivity data, beginning as earliest as possible. Such integrated data should be used by the MOH's upper management both (i) to assess management performance by facilities' directors, and (ii) to strengthen budget preparation and justification in the annual budget preparation process.

Box 2 complements the sample outline portrayed, presenting a case study of an assessment of the health sector in Jordan, under the USAID funded Fiscal Reform II project. Although the tool presented herein is yet to be applied in a country in its entirety, the case study illustrates the gathering of data and the calculation of important efficiency indicators presented in this tool, as well as the type of issue analysis in the use of health inputs that should be included in the assessment report. This case study is a summary of a large working paper evaluating healthcare services in Jordan (USAID, 2011).

Box 1.

Sample Assessment Report Outline

General Overview: presents an overview of the report, defines efficiency in health resource input, and defines the scope of the assessment (primary, secondary, tertiary facilities)

- Successes in health resource use (portrays productivity and utilization rates in certain regions, facilities, and/or overall health system)
- Issues, findings and recommendations (identifies specific issues in the use of specific resources, or issues in certain type of facilities, or certain regions; provides quantitative findings, and provides recommendations for tackling these)
- MOH efforts for improving resource use efficiency (states ongoing initiatives for attacking issues while improving efficiency)



Box 2.

CASE STUDY: Enhancing Health Services in Jordan (USAID, 2011)

The Public Expenditure Perspectives project, part of the USAID's Jordan Fiscal Reform Project II, provides useful analysis and recommendations about Jordan's public expenditure policies and the programs funded through the public budget, including the health sector. This assessment of the health sector determines that Jordan's health sector is costly, but produces a wide variety of services that result in acceptable levels of health.

The analysis of the health sector in Jordan evaluates programs and activities of the Ministry of Health and makes recommendations for the coming years that can provide greater efficiency and effectiveness in program administration and slow the growth in Ministry of Health system costs.

The assessment makes important findings related to staff utilization, use of facilities and management of pharmaceuticals, among others. Highlights of the study's findings and recommendations include:

- **Issue:** Some health facilities have relatively higher patient loads. The overall time spent with patients is on average less than 15 minutes, but these times vary across health facilities from 8 to 48 minutes (See Table 3). **Recommendation:** Undertake in-depth analysis of patient loads, by type of provider (physician, dentist, nurse, etc.), and link productivity with budget data for long term plan for center consolidation.
- **Issue:** Significant differences in BOR and ALOS between MOF hospitals and private hospitals, that is a 17 percentage point difference in BOR and 45 percent difference in ALOS. **Recommendation:** Development of a comprehensive medium term plan for integrating MOH facilities with the excess capacity of the private sector hospital beds.
- **Issue:** Over-use of prescription drugs and the need to reduce the prescription of brand name pharmaceuticals. **Recommendation:** Identify alternative ones that are cheaper and just as effective.

Table 3. Jordan: Primary Health Centers Patient Data (2011)

Center Name	Doctor and Dentist Visits	Number of Doctors and Dentists	Average per Provider	Patients per		Minutes per Patient
				Day	Hour	
Al-Nuzha Health Center	76,499	5	5,300	61	7.6	7.9
Shafa Badran Health Center	15,172	6	2,529	10	1.3	47.6
Tarbarbour Health (Tareq) Center	47,291	6	7,882	31	3.9	15.3
Abu-Alanda Health Center	48,187	6	8,031	32	4.0	15.0
Al-Qweismeh Health Center	79,884	8	9,986	40	5.0	12.1
Um-Nouwara Health Center	38,747	6	6,458	26	3.2	18.7
Totals	305,780	37	8,364	33	4.1	14.6

The study analyzes a large amount of data and evaluates efficiency, highlighting the need to review the large number of hospitals in Jordan to optimize capacity—in light of the significant unused capacity shown by low occupancy rates and differences in average length of stay between the public and private sector. The study also makes recommendations to make better use of primary care resources, including opportunities to consolidate facilities, reduce cost and improve quality.

» CONCLUSION

The pursuit of efficiency in health systems is a central objective of decision makers and health managers. Ministries of Health often do not have access to the data to properly assess efficiency across their operations—including physician utilization, deployment of health technologies and pharmaceuticals, and use of health facilities and hospital care.

The tool “DATA FOR EFFICIENCY: A tool for Assessing Health Systems’ Resource Use Efficiency” presented here, becomes a practical guide outlining key data categories and indicators necessary for assessing efficiency in the use of resource inputs, provides guidance on sources for these data, and calculation of indicators. Though this tool is not meant to be a comprehensive guide to undertaking efficiency assessments of health resource use, the tool allows managers within Ministries of Health to improve the measurement of efficiency across institutions as well as across time, a critical element for improving the performance of health systems.

The assessment of a health system through this tool equips managers to identify any issues that may not be evident otherwise, also allowing them to derive options and recommendations for tackling these issues while improving efficiency through reducing waste, saving money and maximizing social value. Subsequent activities for this tool may involve initiatives for targeted improvements, development of action plans with measurable time frames, and improvements in data collection and information technology for data support.

Efficiency assessments become important information that complement budget requests, allowing Ministries of Health to provide evidence of internal efficiency and any improvement in efficiency and the use of resources over time and across regions and facilities. Ultimately, the goal is to improve health outcomes and client satisfaction of a country’s health services.

» ANNEX A: FACILITATING DATA COLLECTION (SAMPLE DATA TABLES)

Primary Health Care/Health Services Centers Program – Basic Data

Center Name	2010 Expenditures	Number of Outpatient Visits			Average Cost per Visit	Physicians		Dentists		Nurses		Other Staff	Total Staffing	Average Cost per Visit
		Total	Emergency	Other		Number	Average Annual Visits	Number	Average Annual Visits	Number	Average Annual Visits			
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
681														

Center Name	2010 Expenditures	Number of Outpatient Visits			Average Cost per Visit	Physicians		Dentists		Nurses		Other Staff	Total Staffing	Average Cost per Visit
		Total	Emergency	Other		Number	Average Annual Visits	Number	Average Annual Visits	Number	Average Annual Visits			
682														
683														
684														
TOTAL														



Secondary Health Care/Hospitals Program – Inpatient Care

Hospital Name	2010 Expenditures	Number of Beds	Average Cost per Bed	Number of Staff Positions, End of Year						Staff per Bed
				Physicians	Dentists	Nurses	Pharmacists	Other	Total	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										

Ministry of Health Facility Proximity, Staffing and Service Analysis

MOH Hospital	Total	Hospital 1	Hospital 2	Hospital 3	Hospital 4	Hospital 5	Hospital 6	Hospital 7	Hospital 8	Hospital 9	Hospital 10
Name of Hospital											
Region											
Year expenditures											
Y-1 Expenditures											
Y-2 Expenditures											
Number of beds											
Occupancy Rate											
ALOS											
Admissions											
Outpatient Visits											
ER Patients											
Physicians:											
Specialists											
Qualified											
General											
Dentists											
Nursing Staff											
Pharmacists											
Other Support Staff											
Total Staff											

» ANNEX B. REFERENCES AND RESOURCES

- Antón P, Peiró S, Aranaz JM, Calpena R, Compañ A, Leutscher E, Ruíz V (2007). “Effectiveness of a physician-oriented feedback intervention on inappropriate hospital stays.” *Journal of Epidemiology and Community Health*, 61: 128-134.
- Chisholm, D. and Evans, D. B. “Improving Health System Efficiency as a Means of Moving towards Universal Coverage.” *World Health Report 2010 Background Paper*, 28. WHO, Geneva, 2010.
- Gee J (2006). “Fighting fraud and corruption in Britain's National health Service.” In: *Transparency International Global Corruption Report 2006*. Pluto Press; London, UK.
- Haas JS, Phillips KA, Gerstenberger EP, Seger AC (2005). Potential savings from substituting generic drugs for brand-name drugs: medical expenditure panel survey, 1997-2000. *Annals of Internal Medicine*, 142: 891-7.
- Kurowski C., Wyss K., Abdulla S., Yemadji N., Mills A. (2003). “Human Resources for Health: Requirements and availability in the context of scaling-up priority interventions in low-income countries: Case studies from Tanzania and Chad. *HEPF Working Paper 01/04*. London School of Hygiene and Tropical Medicine; London, UK.
- Lawson, Andrew, et al, “Assessment of Public Finance Management & Procurement systems in the Mozambique Health Sector, 2008. Based on an adaptation of the PEFA Methodology to the Health Sector.” Report prepared for the Government of Mozambique.
- Lewis, Maureen and Gunilla Pettersson. “*Governance in Health Care Delivery: Raising Performance*.” World Bank Policy Research Working Paper, No. 5074, 2009.
- Masiye F (2007). Investigating health system performance: An application of data envelopment analysis to Zambian hospitals. *BMC Health Services Research*, 7: 58.
- OECD. “Health at a Glance 2011: OECD Indicators.” Organization for Economic Co-operation and Development, 2011.
- Oxley, Howard and Maitland MacFarlan. “Healthcare Reform: Controlling Spending and Increasing Efficiency.” *OECD Economic Studies*, No. 24, 1995.
- Peacock, Stuart, Chris Chan, Melvino Mangolini, Dale Johansen, “Techniques for Measuring Efficiency in Health Care,” *Staff Working Paper*, Productivity Commission, Commonwealth of Australia, 2001.
- Sennet, Carey and Katie Starky. “Measuring and Improving Efficiency in Health Care: Report from an ABIM Foundation/IOM meeting,” *Issue Brief*, ABIM Foundation, July 2006.
- USAID. “Public Expenditures Perspectives,” produced under USAID’s Fiscal Reform II Project, December 2011.
<http://www.frp2.org/english/Portals/0/PDFs/PEP%20Book%2020%20Mar%202012.pdf>



World Health Organization. *Health Facility Survey: Tool to evaluate the quality of care delivered to sick children attending outpatients facilities*. Department of Child and Adolescent Health and Development. WHO, 2003.

World Health Organization. *World Health Report 2010*. WHO, Geneva, 2010.
<http://www.who.int/whr/2010/en/index.html>





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